1. consider the function $f(x) = (x^2 - 1)^3$.

(a) for what values of x is the function increasing?
(solve and support analytically)

(b) find the coordinates for relative minimum and maximum point(s).
(solve and support analytically)

(c) for what values of x is the graph of f(x) concave up?
(solve and support analytically)

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2. Let f be the function defined by

$$f(x) = 12x^{\frac{2}{3}} - 4x$$

(a) Find the intervals on which f is increasing.

(b) Find the x and y coordinates of all relative maximum points.

(c) Find the x and y coordinates of all relative minimum points.

(d) Find the intervals on which f is concave downward.

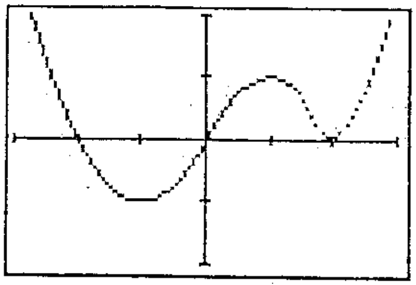
(e) Sketch the graph of f.

3. $f(x) = x^3 - 2x - 2\cos(x)$

Determine the critical points for the above function.

4. for the function $f(x) = \frac{x^3}{3} - 3x$, find the value(s) that satisfy the mean value theorem on the interval $-2 \le x \le 2$.

5.



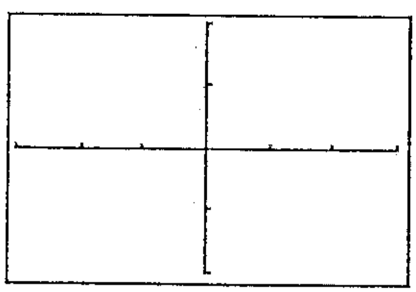
[-3, 3] by [-2, 2]

The graph to the left shows the graph of the derivative of a function, f.
The domain of the function is the set of all x such that $-3 \leq x \leq 3$.

a) For what values of x does f have a relative maximum? A relative minimum? Justify your answer.

b) For what values of x is the graph of f concave up? Justify your answer.

c) Use the information found in the above sections and the fact that $f(-3) = 0$ to sketch a possible graph of f on the graph provided below.



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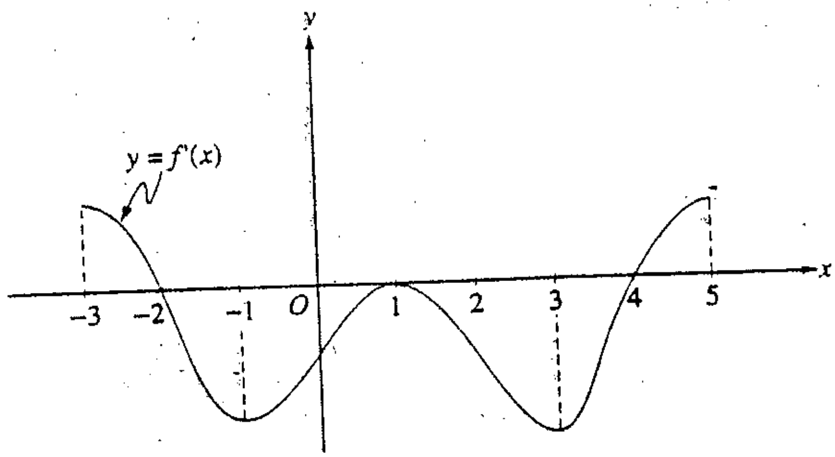

Note: This is the graph of the derivative of f, not the graph of f.

1. The figure above shows the graph of f', the derivative of a function f. The domain of f is the set of all real numbers x such that $-3 < x < 5$.

   (a) For what values of x does f have a relative maximum? Why?

   (b) For what values of x does f have a relative minimum? Why?

   (c) On what intervals is the graph of f concave upward? Use f' to justify your answer.

   (d) Suppose that $f(1) = 0$. In the xy-plane provided, draw a sketch that shows the general shape of the graph of the function f on the open interval $0 < x < 2$.